

植物研究雑誌
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○Ovule の胚珠ニ非ザル證據ヲ見ヨ

牧野富太郎

今日ノ人、悉クトハ言ハザルモノ百人ノ内九十九人マデハ花中、子房（Ovary）内ノ Ovule ヲ胚珠ダト稱ヘテヨリ又書イテキル、私ハ元來其レハ大ナル誤デアツテ此 Ovule ハ斯ク譯スベキモノデハ無イ事ヲ數シバ切言シテ世ニ問フタ、ソシテ須ラク卵子ノ語ヲ以テ之レニ換ユベキ事ヲ世人ニ告グタ、是レハ取りモ直サズ圓イモノヲ圓イト言フベシ角イモノヲ角イト言フベシト云フニ均シク少シモ無理ノナイ慾漁デアル、幸ニ世人ノ中ニハ私ノ此勸説ヲ容レテ贊意ヲ表セラレ、否ナ、其誣フベカラザル明白ナ事實ノ前ニ潔ギヨク之レヲ承認セラレタ方モアツタガ尙一般ニハヤハリ舊慣ヲ墨守シ其誤用ヲ敢テシテ恬然之レヲ省ミザル方ガ多イ、私ハ之レヲ見テ世人ハ何故ニ惡ヲ去テ善ニ移リ非ヲ避テはニ從フニ吝カデアルカラ慨カズンバアラズデアル
從來毎々言ヒシ如ク Ovule ヲ胚珠ト定メシハ抑モ誰レデ又何時頃ニ其ンナ事ヲ爲タノカト言フト是レハ明治六年ニ當時東京ノ博物局ニ在勤ノ小野聰^{モトヨシ}氏（小野蘭山ノ後裔）ガ英國ノ植物學者 JOHN LINDLEY 氏ノ著ナル『School Botany』ヲ譯シテ『植物淺解』ト題スル一書ヲ編述シ今カラ五十八年前ノ紀元一千五百三十四年即チ明治七年ニ之レヲ當時ノ文部省デ刊行シタ時ニサウシタモノデ同書ニハ諸處ニ Ovule ヲ胚珠ニ充テ、書キ一種子ハ胚珠ノ成熟セルモノ』ナドノ語ガ見エテキル、又此書ヲ編スル時之レト關聯シテ同時ニ同氏ガ譯述シ明治七年五月ニ同ジク文部省デ發行シタモノニ『植物譯筌』一冊ガアルガ此書中ニモ亦同様ニ Ovule ヲ胚珠ト定メテ

植物學

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Ovule の胚珠ニ非ザル證據ヲ見ヨ



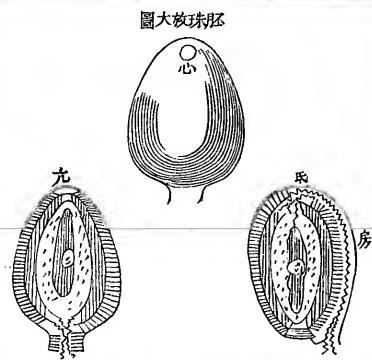
要在事、可準之
在萼上、此最
分植物之類

子房有與萼之本相粘附者、則在萼下、有不相粘附者、則
如子間有成小枝者、如丑

居中之胎座恆甚小、有漸大卽爲果者、若楊梅之類是也、
卵在胎座內、後成種子、卵大率居子房之中、或有無子房
而露生者、得雄粉卽成種子、如松實是也、故此類之花心、
受鬚粉最易、卵或有莖、或無莖、卵有胞、或一層、或二層、卵

舉ゲテアル
右小野氏ノ創メテ作ツ
タ字面デアルカト言フ
ト決シテサウデハナイ
即チ此レハ其源ヲ支那
セル一書ニ發シテキル
此『植物學』ハ漢文ノ一
冊書デ書中ガ八卷ニ分
レ前ノ七卷ハ支那ニ居
タ英國人ノ韋廉臣氏ガ
譯シテ支那人ノ李善蘭
氏ガ筆述シ末ノ一卷ハ
艾約瑟氏ガ續譯シテ同
ジク李氏ガ筆述シ以テ
一般植物學ヲ叙説シ今
カラ七十五年前ノ咸豐
七年ニ開雕シテ世ニ公

内有胚珠一點、即異日果中之胚也。胚珠先生、胞後生。凡二層之胞、其二層必有相附連之處。



凡胚珠與二胞、其下相連者、則胚珠之末、必與卵之末同方向、如「亢」若胚珠之末與卵之末同方向相反、則胚珠與胞相連之處必在上、如「氐」此必有一螺旋體、令卵與胚珠相通、如「房」胞之二層相連處有口、胚珠之上面恒與口相通、故胚珠之下、與卵之下、恰相對、

ニシタモノデアル、我邦デハ今カラ六十五年前ノ慶應三年ニ下野足利ノ求道館デ之レヲ翻刻シ發行シタノデ今日デモ往々坊間ノ書肆ニ之レヲ見受ケル、即チ此書ニ始メテ胚珠ノ名ガ出テキテ前ノ小野氏ハ此レカラ其レヲ取り出シタモノデアル然ルニ此時右小野氏ノ「ボタニー」ニ對シテノ知識ガ不充分デアツタト見エ能ク此書ノ意味ガ同氏ニハ會得ガ出来ナカツタラシク其胚珠ノ正體ガハツキリ判ラスマニ其邊ノ事ヲ取

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蓋口在卵之上面也、亦有胚珠之上恰對卵之下者、則口在卵之下面察口之處爲最要事、知此卽知胚從何處生也、胚珠之中有細胞體、如心胞體中有汁、胚生於汁中、

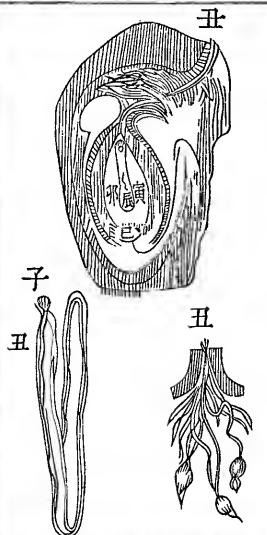
孕胚之法、粉點飛至心口、中有細長管透出、或一或二或三不定、其管屈曲擠入心之聚胞體、刺入子房中、入卵之

口、遇胚珠、胚珠內細胞

體中之汁動盪而孕胚、

花孕胚時、以寒暑表測

之、熱度加多如圖、子爲



拔ツタ爲メ元來胚珠ハ Ovule ノ中心體卽チ今
日謂フ珠心ナル Nucleus (= Nucellus) ニ對スル譯語デアツタモノヲ Ovule (譯語ハ卵トアル) ノ譯語デアルト感違ヒシテ其處デ前記ノ通り Ovule ガ胚珠トナツタ譯デアツタ同此勇敢ナル行爲ノ爲ニ其後ノ學者ハ皆此誤リヲ受ケ繼イデ今日ニ及ンデキル、疾クニ此いきさつヲ知ツタ私ハドウモ此誤ヲ正サナクテハ學問ニ對スル良心ガ許サナインデ爾來幾度カ聲ヲ勵マシ其匡正

粉、丑爲細長管、寅卵爲胚珠、辰爲細胞體、巳爲螺旋體之末、卯內有孕一胚者、有孕二胚者、有孕多胚者、胚初孕、胚之生根處能自行至口、胚先吸胚珠內之胚乳、吸盡乃吸子房內之胚乳、

本樹之粉、交本樹之花心、則生本類、若偶交他樹之花心、則生變類、如松粉交柏之花心、則所生非松非柏也、凡變類之葉略似父、而花略似母也、變類不傳種、而間亦有傳種者、

粉囊裂時、卷而相交錯、多隙、故粉易出也、

直角茎

卷之

Ovule の胚珠ニ非ザル證據ヲ見ヨ

ヲ高調シタガ尙飽キ足
ラナイノデ今日モ尙其
叫ビヲ續ケテキル
此ニ面白イ事ガアル、
今試ニ上ノ漢文ノ『植物學』が譯述セラレタ
其原書ガ何ンデアッタ
カヲ繹ネテ見ル、其漢
譯書ノ方ニハ書中ニ其
原本ニ關シタ事ガ片鱗
モ書イテナイノデ其邊
ノ消息ガ能ク判ラナカ
ツタガ私ハ偶然ニ其原
書ガ JOHN LINDLEY 氏
著ナル “The Elements
of Botany” デアルコ
トヲ知ツタ、然シ譯文
ノ方ハ原本ノ全譯デハ
ナク其重要ナル要處ヲ

Ovule
ノ胚珠ニ非ザル證據ヲ見

XVIII.—OF THE OVULE.

526. THE OVULE¹⁹⁰ is a body borne by the placenta (486), and destined to become a seed.

527. It is to the carpel (480) what marginal buds are to leaves (293), and to the central placenta what buds are to branches.

528. It may be regarded as a bud with a retrograde development.

529. The ovule is usually inclosed within an ovary (472); but in Conifers and Cycads it is destitute of any covering, and is exposed, naked, to the influence of the pollen.

530. It is either sessile, or attached by a little stalk called the *funiculus*, or *podosperm*. The point of union of the funiculus and ovule is the *base* of the latter, and the opposite extremity is its *apex*.

531. It consists of a sac, or of two sacs, one inclosed within the other, and of a *nucleus* within the sacs.

But M. Planchon has shown that the nucleus of *Veronica hederifolia* is destitute of sacs, being absolutely naked. See his excellent *Mémoire sur les vrais et les faux arilles*. 4to, Montpellier, 1844.

532. These sacs are called the *primine* and *secundine*.

The nucleus is first formed, then the secundine, and then the primine, as is shown by the figures at fig. 180. The nucleus would seem to be itself a growing point, and the sacs to be scales formed round it analogous to the scales of a leaf-bud. In the bud itself the growing point comes first, necessarily; then succeed the scales.

533. The primine, secundine, and nucleus, are all connected with each other by a perfect continuity of tissue, at some point of their surface.

534. When the parts of the ovule undergo no alteration of position during their growth, the two sacs and the nucleus are all connected at the base (530) of the ovule, which is *orthotropal*^{190 191 a} or *atropal*¹⁹⁰.

535. And then the base of the nucleus and that of the ovule are in immediate connection with each other¹⁷⁷.

536. But the relative position of the sacs and the base of the ovule are often entirely altered during the growth of the latter, so that it frequently happens that the point of union of the sacs and the nucleus is at the apex (530) of the ovule^{190 c}.

537. And then the base of the nucleus is at the apex of the ovule.

538. In such cases, a vascular connection is maintained between the base

Fig. 190.—A An orthotropal ovule, highly magnified, showing the foramen; B a section of it; C a section of an anatropal ovule; * the foramen; f the chalaza; e the raphe; d the sac of the amnios.

THE OVULE.

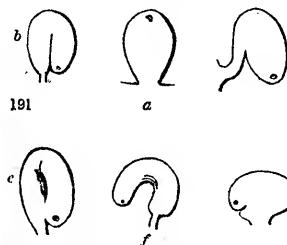
95

of the ovule and the base of the nucleus, by means of a bundle of vessels called a *raphe*^{190e}.

539. The normal position of this raphe is on the side of the ovule, next the placenta.

540. The expansion of the raphe, where it communicates with the base of the nucleus, gives rise to the part of the seed called the *chalaza* (642)^{190f}.

541. When the ovule is curved downwards so as to approach the placenta, it is *campotropal*^{191b}; when curved downwards and grown to the lower half, *anatropal*^{190e 191c}; when attached by its middle so that the foramen is at one end and the base at the other, it is *campylotropal* or *amphitropal*^{191e}; when horse-shoe shaped it is *lycotropal*^{191f}; when anatropal with the raphe half loose, it is *semianatropal*^{191d}.



542. The mouths of the primine and secundine usually contract into a small aperture called the *foramen* of the ovule, or the *exostome*^{190*}.

543. The apex of the nucleus is always applied to this foramen.

544. In consequence of the relation the base of the nucleus bears to the base of the ovule, the foramen will be at the apex of the ovule when the two bases correspond, and at the base of the ovule when the two bases are diametrically opposite.

545. The foramen indicates the future position of the radicle of the embryo; the radicle being usually next the foramen. This is a fact of great importance in practical Botany.

Gasparrini, however, asserts that, in the China orange, this is sometimes reversed: the radicle being turned to the chalaza.

546. Within the nucleus is a cavity or bag, called the *sac of the amnios*^{190dd}, containing a fluid, in which the embryo is developed.

The nucleus of some plants is pierced by the amniotic sac, which projects beyond the foramen as a tube, as in *Santalum*, *Narthecium* (557), &c. M. Planchon also found that in *Veronica hederaefolia* (531) the side of the naked nucleus is ruptured lengthwise by the amniotic sac, so as to become naked also. Something quite analogous occurs in *Avicennia*.

1.c.

抄譯シタモノデアル、此處ニ其原本ト譯本トニ就テ上述胚珠問題ノ局部數頁ヲ摘載シテ世人ノ參考ニ供シ以テ其胚珠ガ元來Ovuleノ名デハナクテ正ニ其Ovuleノ中心體ナル珠心即チNucleus(= Nucellus)ノ譯語デアル事實ヲ示シ、而シテOvuleハ謂ユル胚珠デハナクテ卵(卵子)ト云フノガ當然且正確デアル事ヲモ明カニシテオク、即チ右掲出ノ數頁ハ其漢文ノ方ハ上ノ『植物學』カラノ轉寫デ其歐文ノ方ハ同ジクLINDLEY氏カラノ複寫デアル、讀者ハ幸ニ之

HYBRIDS.

Ovule
ノ胚珠
ニ非ザル
證據ヲ見
ム

XIX.—OF FERTILISATION.

547. THE fertilisation of a flower appears to be accomplished by the action of pollen (452) upon the stigma (477).

The proofs of this are so many and so seemingly conclusive, that it is usual to regard the proposition as unassailable. But it is necessary to add that some facts are apparently irreconcilable with it. The chief of these is the case of a dioecious Spurge-wort, allied to Sapium, and called Cœlebogyne, of which the female only is known. This plant produces ripe and *perfect* seeds in the Botanic Garden, Kew; and yet the most diligent search has failed to discover any polliniferous flowers. Is it fertilised by the pollen of some other plant? This seems improbable, because the seedlings are exactly like their mother, which is not the case with vegetable hybrids (551). Certain experiments instituted by M. Girou de Buzareingues have led him to the conclusion, that in Hemp, the *Lycchnis dioica*, and other dioecious plants, the presence of pollen is not necessary to fertilise the ovule (*Ann. Sc.*, 1st ser., xxx. 406). And it appears certain that in some instances Cucumbers have swelled fruit, and ripened seeds, in the absence of pollen. Finally, we have the assurance of Decaisne, that in *Viscum* the ovule is not formed till six weeks or two months after the pollen has acted on the stigma; and Professor Gasparrini maintains that in the Fig-tree the embryo is formed without any fertilisation whatever; for the summer crop of this fruit is obtained from female flowers, which can by no possibility communicate with stamens, the male flowers not being produced at that time, and nevertheless it abounds in seeds containing the embryo; while, on the other hand, the spring figs, *in which male flowers do occur, never have any embryo in their seeds!* The female Hop is fertile without a male. (See *Ann. Sc.*, 3rd ser., v. 306.)

548. The result of that action seems to be the formation of an embryo (650) within the nucleus of the ovule.

549. When the pollen and stigma each belong to the same species, then that species is propagated without material alteration.

550. But if they belong to different species, then their mutual action results in the production of *hybrids*, or vegetable mules.

This is not an artificial process, but happens frequently in wild nature, and is yearly giving rise to the false species of botanists.

551. A hybrid is not necessarily sterile, but is often capable of propagating its race.

552. It is usual for the hybrid to resemble the male parent most in foliage, and the female in flower.

This has been proved to be the general rule by the numerous experiments of the Dean of Manchester. See Dr. Herbert's papers in the second volume of the *Journal of the Horticultural Society*.

553. The expulsion of pollen from the anther is due to the contraction of its valves. It is naturally effected in dry, warm weather; and cannot take place in the presence of wet, except in species whose fertilisation is effected under water.

It is not improbable that, as De Buzareingues has suggested, the noxious effect of wet upon fertilisation may consist partly in preventing the anther-cells from opening, and partly in the activity which it gives to the vegetation of the stem.

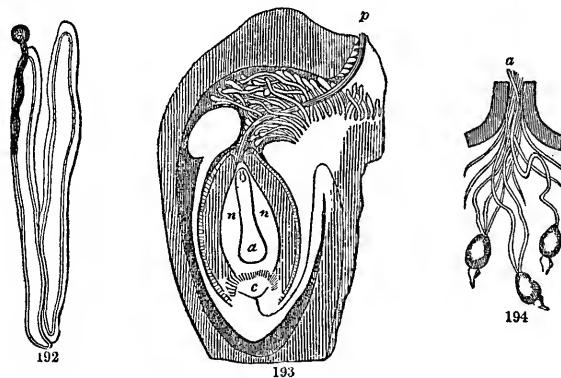
554. The pollen is enabled to act upon the ovule by means of an extension of its inner lining, if it has more than one coat (454), in the form of a tube or tubes.

555. The *pollen-tube* insinuates itself between the cells of the stigma¹⁹², and passes down its conducting tissue till it reaches the interior of the ovary.

556. Having reached the interior, a similar tube appears, and connects the apex of the nucleus of the ovule, through the foramen, with the conducting tissue of the style^{193 194}.

557. The result of this action is the formation of a living point which eventually becomes the embryo.

In the present state of knowledge as to this point, the above seems to be the safest way of stating facts. The common opinion among botanists is, that the pollen-tubes pass directly to the nucleus, through the foramen. There is no question that pollen-tubes of great length grow out of the pollen-grains, and plunge into the stigma. The curious phenomena connected with Asclepiads, and more especially with Morrenia, in which great mechanical difficulties are overcome by the pollen-tubes before they can reach the stigma, prove that this phenomenon is connected with vitality of a very high order. Neither is there room for doubting whether similar tubes appear in the cavity of the ovary, connecting the conducting tissue of the style with the apertures of the ovules (see figs. 193 and 194).



But it may be reasonably questioned whether the tubes are the same in both cases. Not that there is any difficulty in understanding how so great and rapid a growth on the part of the pollen-tubes as is assumed should take place; for the starch of the fiovilla (453) may be regarded as a store of organizable matter provided for this express purpose, as Brown suggested. The doubt arises from the impossibility in many cases of so tracing the small delicate transparent threads as to be certain that they do not become blended with long cells having a different origin, and that it is not the latter which are seen in the cavity of the ovary. It is asserted, indeed, that these tubes have been distinctly traced *ab origine*; and no doubt can be entertained that observers have thought so. The question is, may they not have been deceived? Dr. Dickie, positively asserts that in Narthecium the so-called pollen-tubes in the interior of the ovary are really ovule-tubes, or delicate filaments, rising from the apex of the nucleus, and ad-

Fig. 192.—A grain of pollen sending its pollen-tube down among the stigmatic cells of Papaver.—*Mohl*.
Fig. 193.—A longitudinal section of the carpel of *Euphorbia pallida* at the time when the pollen-tube p has reached the apex of the nucleus nn. It appears as a dark streak passing through the filamentary conducting tissue of the style; a is the sac of the amnios, and c the chalaza.—*Schleiden*.

Fig. 194.—A longitudinal section of the interior of the ovary of a *Helianthemum*, with the pollen-tubes descending from a, and reaching the foramina of the ovules which are forcibly detached from their placenta.—*Schleiden*.

レヲ對照シテ讀マレタナラバ私ノ主張ガ決シテ根據ノナイヨイ加減ナ架空ノモノデハナク乃チサウ言フノガ尤モダト首肯シテ下サルデアラウト確信シテ疑ハヌノデアル
已ニ此ノ如ク其錯誤ガ明白ニナツタ事ヲ知リ得タ人々尙從來ノ形式ニ拘泥シ其濫用誤認ヲ改ムル事ヲ敢テシナケレバ其人ハ臆病デ勇氣ノ無イ事ト且亦學問ニ對スル態度ノ煮切レナイノヲ世人ニ嗤ハル、事デアラウ、又之レヲ改ムル一時ノ不便ト此誤謬ヲ傳ヘテノ千載ノ悔トハ其得失識者ヲ俟テ後ニ知ルベキ問題デハナカラウ

○蓄軒獨語(其四十五)

蓄軒朝比奈泰彦

○邦産バルメリア屬中ヒボギムニア *Hypogymnia* 及メネガツチア *Menegazzia* ノ兩亞屬ノ種類

此兩亞屬ノ地衣ハ舊時ハ何レカノ名稱デ合併シテアツタ、例く^ビ *NYLANDER* (*Flora*, 1881, s. 537) & *Hypogymnia*ヲ設ケ *WAINIO* (*Etud. Lich. Brésil. I.* [1890]) & *Menegazzia* (*MASS.*)ヲ採用^ハ *Hue* (*Lichenes Extra-Europaei*)モ之ニ從テ居ル、コノモ一理アルノデ此兩屬ノ地衣ハ他ノ真正バルメリア *Euparmelia* 亞屬ノモノム異リ裏面ガ全ク裸出シ毛茸ヤ毛根ヲ有シテ居ナイ、ソシテ葉體ガ比較的細ク紐狀ヲナシテ居ルカラデアル、*BITTER* (*Hedwigia*, 1901, s. 171) & *Menegazzia*ヲ其屬ノ創設者タル *MASSALONGO* 『同意シテバルメリアカラ分離シテシマツタノデアルガ其後 *ZAHLBRUCKNER* (*Pflanzen-Familien*, I. Abt. 1 [1907]) ハ之ヲバルメリアノ亞屬トシタ、今此兩者ヲ *ZAHLBRUCKNER* 『從テ分シ』ト左ノ通リデアル

ヒボギムニア *Hypogymnia* 亞屬

メネガツチア *Menegazzia* 亞屬

地衣體ハ通常狹ク、分枝シ裏面ハ裸出シ僅ニ吸盤様
ノ點ニテ基物ニ着生ス

地衣體ハ同上